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General Outcome Measures for Verbal Operants

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A general outcome measure (GOM) can be used to show progress towards a long-term goal. GOMs should sample domains of behavior across ages, be sensitive to change over time, be inexpensive and easy to use, and facilitate decision making. Skinner's (1957) analysis of verbal behavior may benefit from the development of GOM. To develop GOM, we conducted a review of the literature on mands, tacts, echoics, and intraverbals. The four areas reviewed included (a) an examination of the participant's response form (i.e., vocal or nonvocal), (b) the type of prompt used, (c) types of materials used, and (d) timing of responses or sessions. Based on the review of the literature, we developed GOM for mands and tacts. This paper attempts to bridge the concept of GOMs with Skinner's analysis of verbal behavior.
Key words: general outcome measure, verbal behavior, mands, tacts, echoics, intraverbals

The Dow Jones Industrial Average presently indexes 30 industrial companies in the United States. The specific stocks found in the Dow serve as a representation of, or a barometer for, the industrial sector (Sheard, 1998). Other stock indexes representing sectors of business include the NASDAQ, the DJ Wilshire 500, and the Standard & Poor's 500. Investors who watch these indexes do so to gauge the present condition of each market. Thus, a specific index may be thought of as an indicator that measures the general health of the stock market.

Beyond finance, other indicators are used in disciplines like medicine (e.g., heart rate, body temperature) and meteorology (e.g., atmospheric pressure). Education also has these types of indicators. For instance, curriculum-based measurement (CBM) offers a standardized set of measurements in academic performance areas such as reading, math, spelling, and written expression (Deno, 1985; Shinn, 1989). Shinn and Bamonto (1998) characterized CBM as offering dynamic indicators of basics skills (DIBS) for those who measure academic progress in a curriculum.

In DIBS, *dynamic* means that the measures would show sensitivity to differences measured among students and within the student's own behavior across time. *Indicators* refer to performance measures that provide a picture of how well students score on tasks representative of a broader domain. For instance, oral reading fluency tasks require a student to read a passage out loud and yields a per-minute reading frequency. This frequency serves as a sensitive indicator of comprehension competence even when compared to other measures such as questioning, retelling, and cloze (an assessment that has a of a portion of text with a word removed and the student must replace the missing word; Fuchs, Fuchs, Hosp, & Jenkins, 2001). *Basic skills* signify the target measures. CBM basic skills cover reading, mathematics, spelling, and written expression. Basic skills in the previously mentioned subjects serve as the core of higher level learning. Another example of a system with indicators is the dynamic indicators of basic early literacy skills (DIBELS). These are measures that serve as indicators of essential early literacy skills that are necessary for beginning reading acquisition (e.g., phonemic awareness and the alphabetic principle; Kaminski & Good, 1998). Also, a third system with indicators for children aged 0 to 8 years old is the individual growth and development indicator (IGDI). Examples of IGDIs include expressing meaning, social interaction, and adaptive skills.

The characteristics of CBM and its notion of DIBS, DIBELS, and IGDI have all received attention as a *general outcome measure* (GOM), which shows individual progress made towards a long-term goal (Fuchs & Deno, 1991). GOMs should

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> sample relevant domains of development across the desired age range, must be sensitive to growth and change over relatively short periods of time, must be cheap and easy to administer and interpret, and must lead to (and support) evaluations of the effects of ongoing intervention efforts as well as planned variations. (Early Childhood Research Institute Measuring Growth and Development, 1998, p. 4)

Recent research on CBM shows that as a GOM, valid and reliable indicators have been identified for reading, mathematics, and written expression (Foegen, Jiban, & Deno, 2007; McMaster & Espin, 2007; Miura-Wayman, Wallace, Ives-Wiley, Tichá, & Espin, 2007).

Although much research has demonstrated academic GOMs, efforts to identify and test GOMs for young children have begun (Early Childhood Research Institute Measuring Growth and Development, 1998; Greenwood, Carta, & Walker, 2005). McConnell (2000) describes several advantages GOMs have for assessment. First, GOMs center on a measure within a particular domain and can be indexed against a long-term goal. Second, GOMs permit a calculation of the rate of change across time. Third, practioners can easily incorporate GOMs into other progress-monitoring systems.

McConnell (2000) predicted that GOMs would positively affect early childhood special education by offering a means to directly measure the rate of growth in critical domains, make it easier to link assessment and subsequent interventions, contribute to the systematic appraisal of intervention programs, and allow practitioners to determine if current interventions will lead to progress towards the selected long-term goal. Based on the successful research of CBM as a GOM and the emerging research in early childhood special education (e.g., Greenwood, Carta, Walker, Hughes, & Weathers, 2006), it follows that almost any discipline that focuses on educational and behavioral change could benefit by adding a GOM to the portfolio of assessment procedures.

Skinner's (1957) analysis of verbal behavior provides a rich example of understanding language and communication through behavior–environment functions. Although a large body of research supports the use of Skinner's analysis (see *The Analysis of Verbal Behavior*), the development of GOMs has yet to reach the threshold of practice or appear in the verbal behavior literature. It is logical to assume that GOMs, as already demonstrated in other content areas (i.e., CBM, DIBELS, IGDI), would provide an efficient assessment of verbal operants. The GOM assessment could also provide samples of behavior across ages, could reliably detect change over time, would be easy to administer and understand, and could facilitate decision making of verbal behavior instruction and interventions.

In addition, the ease of administration and subsequent decision making can augment comprehensive assessments such as the assessment of basic language and learning skills (Sundberg & Partington, 1998). This type of assessment is a summative evaluation that provides information on selected skills for some period of time (e.g., 6 months). A verbal behavior GOM offers formative evaluation of a student's progress towards a specific verbal operant goal. A goal might include the functional acquisition of manding, as defined by requesting items that are present in the student's environment. The verbal behavior GOM would sensitively and frequently measure growth and development over time and inform the behavior analyst if the student is on track to reach his or her goal or requires different instruction or more intense intervention. Thus, we argue for the utility of a GOM and attempt to bridge the concept of GOM with Skinner's (1957) analysis of verbal behavior.

To develop the GOM, we conducted a review of the literature on mands, tacts, echoics, and intraverbals. Based on this review, we developed a GOM for verbal operants. We used four areas of the literature to guide the development of the GOM. The four areas reviewed included an examination of (a) the participant's response form (i.e., vocal or nonvocal), (b) the type of response prompt used, (c) types of materials used, and (d) timing of responses or sessions. This information guided the construction of a GOM for verbal operants.

LITERATURE REVIEW

We conducted a search in PsychINFO for the four verbal operants. The terms used in

this search included *verbal operant, verbal operant training*, and *verbal behavior*. For example, in the mand search we used the terms *mand*, *mand training*, and *verbal behavior*. We conducted a similar search for the other three verbal operants. This resulted in 121 articles. The articles were then compiled and compared to the articles found in Dymond, O'Hora, Whelan, and O'Donovan (2006). Dymond et al.'s review also examined verbal operants (i.e., mand, tact, intraverbal, and echoic) using Skinner's (1957) analysis, yielding 71 additional articles. The resulting 192 articles from the PsychINFO search and those of Dymond et al. were included in the current review if they met the following criteria:

1. Articles were in peer-reviewed publications and written in English.
2. Researchers defined mands, tacts, intraverbals, and echoics based on Skinner's analysis.
3. The dependent variable included mands, tacts, intraverbals, and echoics.
4. Participants were 18 years old or younger.

An article did not meet inclusion criteria if (a) the study did not label the verbal operants (e.g., Charlop & Trasowech, 1991; Eikeseth & Nesset, 2003); (b) the study examined another of Skinner's verbal operants (e.g., Howard & Rice, 1988); (c) the study measured but did not train a verbal operant (i.e., assessment or description) (e.g., Daly, 1987; Greene & Hafer-Bry, 1991); (d) the study did not base definitions of mand, tact, intraverbal, and echoic on Skinner's analysis (e.g., Mayes, 1988; e.g., a *tact* is defined as a verbal operant in which the form of the response is controlled by a prior nonverbal stimulus, and a tact is not defined if the form of the response is not controlled by a prior verbal stimulus); or (e) the study did not clearly describe verbal operant outcomes (e.g., Hancock & Kaiser, 1996; e.g., if a verbal operant is a by-product of an intervention and is not the dependent variable). After applying these criteria, the current review resulted in 67 studies (55 articles).

Interobserver Agreement

One of the authors coded all of the information and an independent observer was instructed how to review all of the coded information in regards to the original source material. An agreement occurred when the independent observer agreed with the primary coding information (i.e., student response, type of prompt used, materials used, participant's response form). Interobserver agreement checks were conducted for all of the information sources. Using the total agreement method (dividing the smaller total by the larger total and multiplying by 100%), interobserver agreement was 100%.

RESULTS

A total of 55 articles were reviewed. Table 1 lists the articles, authors, year of publication, and whether the study involved training related to mands, tacts, intraverbals, or echoics. In Tables 2 through 5, data are presented related to each verbal behavior component. Studies are categorized according to whether participants were vocal or nonvocal, the type of response prompt used, response required from the participant, materials, and timing. As noted previously, data could be listed in more than one category.

Mands

Participants and prompts. Table 2 lists data for mands. There were 57 participants in 34 articles related to mand training; 28 participants were vocal and 29 were nonvocal. The most frequently used response prompt was a combination or hierarchy of prompts including vocal, model, or physical prompts (10), followed by vocal prompts exclusively (nine). For example, Derby et al. (1997) trained parents to use a vocal prompt and, if necessary, a physical prompt to evoke mands from their children. In seven instances, interruption or removal of an item was used as the prompt.

Response modes. Responses required by the participants for mand training centered on requesting a desired item or event; the most frequently noted requests were vocalizing a word or phoneme (14), signing for an item (11), or vocalizing using a sentence (10).

Consequences. Consequences used in mand training most frequently included tangible items (e.g., food, toys, picture cards), attention (three), and escape from an activity

Table 1

Authors and Publication Year	Verbal operant			
	Mand	Tact	Intraverbal	Echoic
Baer and Detrich (1990)		√		
Barberaand Kubina (2005)		√		
Barnes-Holmes, Barnes-Holmes, Roche, and Smeets (2001)		√		√
Bartman and Freeman (2003)	√			
Bourret, Vollmer, and Rapp (2004)	√			
Bowman, Fisher, Thompson, and Piazza (1997)	√			
Braam and Sundberg (1991)	√	√		
Brown et al. (2000)	√			
Carroll and Hesse (1987)	√	√		
de Freitas Ribeiro (1989)		√		
DeLeon, Fisher, Herman, and Crosland (2000)	√			
Derby et al. (1997)	√			
Drasgow, Halle, and Ostrosky (1998)	√			
Drash, High, and Tudor (1999)	√			√
Esch, Carr, and Michael (2005)				√
Finkel and Williams (2001–2002)			√	
Gobbi, Cipani, Hudson, and Lapenta-Neudeck (1986)	√			
Greer, Stolfi, Chavez-Brown, and Rivera-Valdes (2005)			√	
Hall and Sundberg (1987)	√			
Hartman and Klatt (2005)	√			
Horne, Lowe, and Randle (2004)		√		
Johnson, McComas, Thompson, and Symons (2004)	√			
Kahng, Hendrickson, and Vu (2000)	√			
Karmali, Greer, Nuzzolo-Gomez, Ross, and Rivera-Valdes (2005)		√		
Kern, Carberry, and Haidara (1997)	√			
Lalli, Mauro, and Mace (2000)	√			
Lamarre and Holland (1985)	√	√		
Lowe, Horne, and Hughes (2005)		√		
Lowe, Horne, Harris, and Randle (2002)		√		√
Lowenkron and Colvin (1992)		√		
Luciano (1986)			√	
Marcus and Vollmer (1996)	√			
Miguel, Petursdottir, and Carr (2005)			√	
Murphy, Barnes-Holmes, and Barnes-Holmes (2005)	√			
Nuzzolo-Gomez and Greer (2004)	√	√		
O'Neill, Faulkner, and Horner (2000)	√			
Partington and Bailey (1993)			√	
Partington, Sundberg, Newhouse, and Spengler (1994)		√		
Peck, Wacker, Berg, and Cooper (1996)	√			
Petursdottir, Carr, and Michael (2005)	√	√		
Richman, Wacker, and Winborn (2001)	√			
Ross and Greer (2003)	√			
Sundberg, Endicott, and Eigenheer (2000)		√		
Sundberg, Loeb, Hale, and Eigenheer (2001–2002)	√			
Taylor et al. (2005)	√			
Tenenbaum and Wolking (1989)			√	
Tincani (2004)	√			

Table 1, *cont.*

Authors and Publication Year	Verbal operant			
	Mand	Tact	Intraverbal	Echoic
Tsiouri and Greer (2003)	√	√		
Twyman (1995)	√	√		
Vollmer, Borrero, Lalli, and Daniel (1999)	√			
Watkins, Pack-Tiexeira, and Howard (1989)		√	√	
Winborn, Wacker, Richman, Asmus, and Geier (2002)	√			
Woods (1984)		√		
Yamamoto and Mochizuki (1988)	√			
Yoon and Bennett (2000)				√

Table 2
Mand analysis

Participants	Vocal	28
	Nonvocal	29
Response prompt	Verbal (e.g., experimenter asked, ''Do you want this?'' or ''What do you want?'')	9
	Model (e.g., experimenter stated, ''If you want this, say [item].'')	1
	Physical (e.g., experimenter paired a physical sign prompt with the spoken word.)	3
	Combination or hierarchy (e.g., echoic prompt for item targeted for mand training.)	10
	Errorless or faded prompting (e.g., physical prompt from the student to hand the experimenter a food card; if no response after 5 s, verbally prompted to hand the food card.)	1
	Interruption or removal of item (e.g., parent presented a task. After 30 to 60 s, parent asked the student, ''Do you want a break?'' Parent removes the task during the break.)	7
	Proximity (e.g., person sat across from the student presenting reinforcing items.)	1
	None	3
Student response	Sign for item	11
Request desired item or event	Vocalize word or phoneme	14
	Vocalize sentence with or without adjective	10
	Hand break card or item card	8
	Touch teacher or therapist	1
	Touch ball or microswitch	2
	Point at desired item or card	2
Consequences	Tangible items	33
	Attention	3
	Escape	2
Timing	Within trial 5 s	3
	Within trial 20 s	2
	Total time per trial 1 min	2
	Total time per trial 5 min	4
	Total time per trial 10 min	1
	Untimed (e.g., all vocalizations other than a cry or scream received reinforcement.)	22

Table 3
Tact analysis

Participants	Vocal	18
	Nonvocal	14
Response prompt	Select choice from pictures of toys (e.g., student shown pictures of toys and asked ''Which toys will you play with today?'')	1
	Label objects or actions (e.g., student shown cards with pictures and asked, ''What is it?'')	17
	State if played with toy from picture (e.g., self-tacting: student shown a picture and asked if he had played with the toy.)	1
	Computer graphic/orient directional arrows (e.g., student learned to tact when comparison did and did not match the direction of the arrow.)	1
	None	1
	Select choice from objects	1
Student response	State choice of toy	1
	Verbal label of action or object	14
	State yes, no, or complete sentence (e.g., student states ''It's a [adjective–object pair].'')	1
	Verbal label of salient stimuli	1
	State object location (e.g., student tacted ''on the left'' or ''on the right.'')	1
	Orient graphics correctly (e.g., student turned a pointer.)	1
	Label objects with correct adjective	3
	Give object to experimenter (e.g., student handed the correct stimuli to experimenter.)	1
Materials	Pictures	6
	Objects	13
	Computer with graphics of directions	1
	None	1
Timing	Respond within 3 s	3
	Respond within 4 s	1
	Respond within 5 s	2
	Respond within 7 s	1
	Interrupted chain of activity until label given (e.g., during an activity chain, student had to mand for missing items.)	1
	Untimed	13

(two). In most studies (22), no information was given related to how sessions were timed. However, when information on timing for mand training was given, the data included the total time for the trial and length of time required for a mand to be given. Data for total trial time were given in seven studies and ranged from 1 min (two) to 10 min (one) in length. The time within trials was used to indicate the rate at which a mand needed to be performed by the participant. Data were given in five studies for within-trial timing; times ranged from 5 s (three) to 20 s (two).

Tacts

Participants. Table 3 contains information related to tacts. A total of 22 participants were included in tact training. Of these, 18 were vocal and 4 were nonvocal. In the majority of studies (14), participants were asked to vocally label an action or object. For example, Partington, Sundberg, Newhouse, and Spengler (1994) presented stimuli to participants, asked the question, ''What is that?'' and recorded and reinforced correct tacts (p. 733).

Table 4
Echoic analysis

Participants	Vocal	2
	Nonvocal	3
Response prompt	Ask student to say object or action	3
	Match vocal stimuli (e.g., student said a sound, experimenter repeated the sound, and student repeated the experimenter.)	1
	Present vocal stimuli	2
Student response	Label object or action	3
	Vocally match experimenter	3
Materials	None	2
	Tangible items (e.g., food)	3
	Attention (e.g., tickling)	1
Timing	3 min	1
	5 s between trials	1
	Untimed	3

Materials. Materials included tangible objects (13) as well as pictures of objects (six). Most studies included information on the timing of tact training (13). Of the eight studies that did include timing data, times ranged from 3 s to 7 s. In addition, one study used an interrupted chain procedure to determine the timing of tact training.

Echoics

Participants and prompts. Five articles were reviewed that centered on echoic training; Table 4 contains the echoic data analysis. Five participants were included in the studies; 2 participants were vocal and 3 were nonvocal. The type of response prompt used most frequently included having the participants repeat a word (three), followed by presentation of other vocal stimuli (two). As an example of the echoic procedure, Barnes-Holmes, Barnes-Holmes, Roche, and Smeets (2001) presented objects to participants and said, ''Say [item].''

Response modes. Responses from students in echoic training included labeling a tangible object or action (three) and vocally matching the experimenter (e.g., the participant is asked to repeat a sound or word) (three). Although the response form falls under the category of an echoic, the authors also included other verbal operants in their procedures (e.g., tacting). Esch, Carr, and Michael (2005) demonstrated echoics by presenting target vocal stimuli once and waiting for the participant to match the vocal stimuli.

Materials and other consequences. Materials used in echoic training most frequently included tangible items (three), although two studies did not specify materials or reinforcers, and one used attention (tickling). The majority (three) of the studies did not list increments of time related to echoic training. One researcher listed total time of trial duration as 3 min. One researcher listed 5 s per trial in echoic training.

Intraverbals

Participants and prompts. Results of the review for intraverbal training are listed in Table 5. There were a total of seven participants included in intraverbal training; all participants were vocal (seven). Type of prompt used varied widely and included asking participants to list topics or categories (four), expand on a given topic (three), or answer direct questions (two). For instance, Luciano (1986) had participants list items in preselected categories (e.g., types of drinks). Other prompts included asking the student to spell words (one), recall the facts of a story (one), and select items from a given response class (one). To illustrate an intraverbal spelling response, Greer, Yaun, and Gautreaux (2005) had participants orally spell words previously learned through written responses.

Table 5
Intraverbal analysis

Participants	Vocal	7
	Nonvocal	0
Response prompt	Direct question (e.g., experimenter asked the student a question.)	2
	Spell words (e.g., student taught to spell words on paper prior to verbally spelling words.)	1
	List topic or categories (e.g., experimenter said, ''Tell me the names of foods or vehicles.'')	4
	Expand on topic (e.g., student asked to ''say more'' or ''name a different one.'')	3
	Free recall of story facts	1
	Select items from response class (e.g., experimenter said, ''give me [food, drinks or vehicles].'')	1
Student response	Full sentence that made sense	1
	Spelled words vocally	1
	List items from categories (e.g., student listed as many fruits [or other category] as possible in 10 s)	4
	Selected items from a response class (e.g., student provides the experimenter with an item from the response class.)	1
	Recall of story facts	1
	Cloze procedure worksheet (e.g., student filled in blanks on recall questions.)	1
Materials	Items from different classes	1
	Stories	1
	Cloze worksheets	1
	Reinforcers	1
Timing	30-min sessions	1
	3-s latency	1
	10-s latency	1
	30-s latency	1
	Untimed (e.g., 20 learn units per session, with a learn unit defined to include an initial prompt, response [if necessary, error correction and correct response], and reinforcement; ends at the beginning of the next learn unit.)	3

Response mode. Responses required of students in intraverbal training most frequently consisted of asking them to list items from a given category (four). Other required responses centered on stating a full sentence ''that made sense'' (one), spelling words vocally (one), selecting items from a response class (one), recalling story facts (one), and completing a cloze procedure worksheet (one).

Materials. Materials and reinforcers used in intraverbal training also varied. Tangible items from different classes (one), stories (one), cloze worksheets (one), and reinforcers (one) were used. Timing requirements of intraverbal training included one study with a total trial time of 30 min and three others that included response latencies ranging from 3 s to 30 s. In three of the seven articles, no time requirements were given.

DEVELOPMENT OF GOM PROCEDURES

We used the literature review to inform our development of GOMs for the mand and tact verbal operant; due to the limited number of studies published, we cannot offer a GOM for intraverbal ($n = 11$) and echoic ($n = 11$) verbal operants. In other words, we used the most common procedures to guide our creation of the GOM. Tables 2 through 5

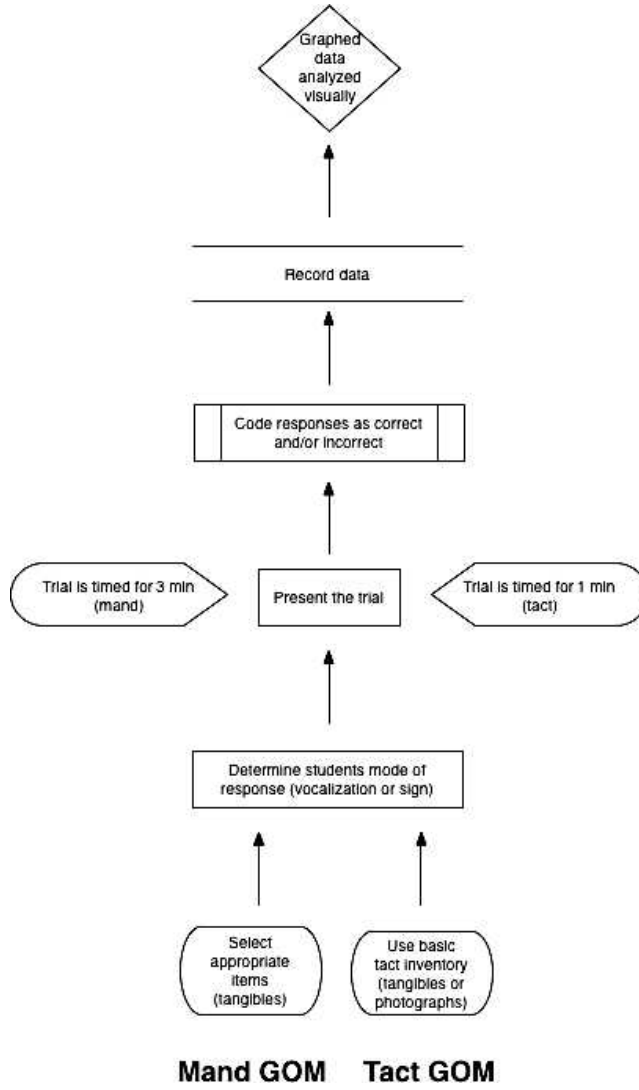

Figure 1. A flow chart shows the use of a general outcome measure for the mand and tact verbal operants.

show a distillation of the primary attributes of the verbal operants that were studied. These primary attributes became the basis for the GOM construction. Specifically, we reviewed the results from the mand and tact analyses and developed each specific measure within a framework of GOM guidelines. The framework meant that each measure (a) sampled relevant domains of the verbal operant, (b) could adequately show growth and change over time, (c) would be inexpensive and easy to use, and (d) could result in the evaluation of formative interventions. Although we acknowledge that the proposed GOM for manding and tacting does not include all possible response forms (e.g., manding information using why, manding future items, or tacting objects specific to some activity), the procedure attempts to establish a first step towards using GOMs with verbal operants.

Figure 1 presents the steps for conducting a GOM for the mand. The first step involves identifying appropriate materials. The materials must have a reinforcing value for the student. To determine the reinforcing value

of stimuli one must conduct a reinforcer assessment (e.g., DeLeon & Iwata, 1996; Fisher et al., 1992). Before conducting the reinforcer assessment, the student's activities should be monitored to determine if any motivative operations may influence assessment results. For instance, Gottschalk, Libby, and Graff (2000) found that deprivation and satiation affected preference. Although best practice would emphasize the need to capture motivative operations across the day and in as many situation as possible, the mand GOM must be contrived so that a time-efficient assessment can be implemented.

For the purposes of GOMs, materials should include only tangible items. Although the literature indicates that tangible items, activities, escape, and attention can be used with manding, using only tangible items aids in the efficiency and consistency of administration as well as data analysis. Efficiency is increased by presenting only tangible items because more stimuli can be presented. An activity such as playing a board game would take longer and result in fewer opportunities to respond within a trial than would presentation of a squeeze ball. Consistency permits a more systematic presentation of stimulus items. The efficient and consistent application of stimulus presentations strengthens the reliability and validity of comparisons between trials.

There are several steps necessary for presenting a trial. For the initial step we recommend following a modified multiple-stimulus with replacement procedure (DeLeon & Iwata, 1996). After obtaining the results from the reinforcer assessment, assemble five stimulus items in a straight line 5 cm apart. After the student mands for an item, the experimenter should replace the item with a new item from the reinforcer assessment pool; he or she should not replace the item with an identical item. With replacement items from the reinforcer assessment pool, students can show the ability to mand for a range of items rather than only one or two items.

The next step is to determine the student's response mode to obtain a tangible item. Response mode can include vocal output (e.g., phoneme, word, or full sentence) or nonvocal means (e.g., signing). Then one must set a time limit. Although the majority of mand studies are untimed, it is important to have a time restriction for the creation of a unit of measurement. The unit of measurement should be adequately sensitive to detect behavioral change. Further, the unit of measurement should have a dimensional quantity, such as time appropriate to capture variability and subsequent decision making. Last, a standard and absolute unit of measurement permits comparison to various sources of data (e.g., the student's own behavior, normed groups) (Johnston & Pennypacker, 1993). We chose a 3-min interval to serve as our unit of measurement, which includes total time for all stimulus presentations (trial) as well as time for the student to respond. The 3-min interval was based on a preliminary field test that demonstrated an adequate length of time necessary to present an item, give the student an opportunity to respond, and provide reinforcement.

The trial begins with the experimenter prompting the student with the phrase, ''Tell me what you want.'' This prompt can be delivered vocally or by sign. We suggest using this instruction because the trial must capture mands. As a GOM, mands most closely approximate responses in the natural environment. Questions such as ''What do you want?'' reflect responding to a request (i.e., not a pure mand) rather than a general request for an item or object. Timing begins after the initial instruction.

Responses are coded as either correct or incorrect. Trials in which students vocalize or sign for an object, and then reach and take the corresponding object are coded as correct. Incorrect responses include the student grabbing or reaching for an object without requesting the item. In addition, if the student requests one object but vocalizes or signs for a different one (e.g., requests a cookie but reaches for a doll), the response is coded as incorrect. If the student does not respond within 5 s, the experimenter must prompt the student with ''Tell me what you want.'' Prompted responses, regardless of the response after the prompt, are coded as a prompt. The GOM for the mand must serve as an indicator of the student's ability to mand in the natural environment. Therefore, the experimenter will have three ways to code each trial: correct, incorrect, and prompt.

Correct responding results in access to the item. For edible items, the portions must be

Table 6
Number of labeled items by assessment

Assessment	Number of items	Items overlapping other assessments
EOWPVT (Brownell, 2000)	41	21
TOLD-2 (Newcomer & Hammill, 1988)	20	5
LAP-D (Nehring, Nering, LeMay, Griffin, & Sanford, 1994)[a]	66	22
Denver II (Frankenburg & Dodds, 1990)	5	4
Goldman Fristoe (Goldman & Fristoe, 2000)	36	17
ESI (Meisles, Wiske, & Henderson, 1997)	4	2
Bayley (Bayley, 1993)	11	7
WISC-IV (Wechsler, 2004)	5	4
Battell (Newborj, 2005)	12	8

[a] Labeling of text was not included in totals.

small and the student should consume them immediately. For tangibles, the student can interact with the item for 5 to 7 s. This time frame permits the student to complete the mand. Once the student obtains the item, the experimenter should replace the object with a new item. For instances in which the student does not respond, we recommend that after three successive prompts, the item be removed from the array and replaced with a new one. This tactic guards against the possibility that the five selected items do not have reinforcing value.

Figure 1 presents the steps for conducting a GOM for the tact. Like the mand, the first step involves identifying appropriate materials. The materials for tacts must include visual representations of objects. To determine the range of objects included in the GOM set, we identified various standardized assessments that centered on communication and language. Within these communication and language assessments, we focused on expressive communication. We included only those assessment items that identified common objects. These appeared under various categories such as vocabulary, language, language comprehension, naming, communication, communication language, characteristics of items, speech, expressive language, expressive communication, education language, and labeling. Table 6 shows the standardized assessments from which the content was drawn. The objects used in the GOM represent common objects found in the students' typical environments. Therefore, these objects characterize core vocabulary for students aged 0 to 6 years. However, some of the vocabulary may require modification due to cultural influences. Table 7, a basic tact inventory, lists the tacts culled from the standardized assessments.

For the tact GOM, materials can include both tangible items and photographic pictures. Although the tact can come under functional control of objects, events, situations, or some properties of those objects, events, or situations, we restrict this GOM solely to objects. Objects permit greater consistency for comparisons within and across students. For instance, a simple action like clapping may not be similarly defined across experimenters. Further, we acknowledge that tacts have different levels of complexity (e.g., tacting a ball vs. tacting a red ball).

For tangible items, selected objects should be small enough to display in front of the student. Unlike the mand, the tact GOM can include photographs of objects. Photographs do not include hand-drawn, line-drawn, computer-animated, or other abstract representations of the object. We exclude everything but photographs because representations must closely represent the object itself. Moving beyond photographs introduces variability contingent on the level of abstraction (e.g., hand-drawn pictures, caricatures).

There are also several steps necessary to present the tact GOM. For the initial step, we recommend the modified multiple-stimulus with replacement procedure (DeLeon & Iwata, 1996). Five stimulus items are placed in a straight line 5 cm apart. Using an array of multiple objects or pictures more closely

Table 7
Basic tact inventory

Ball	Train	Hammer	Cat	Window
Wagon	Truck	Shovel	Horse	Zipper
Block	Boat	Girl	Bird	Scissors
Drum	Bus	Man	Chicken	Matches
Doll	Hair	Baby	Duck	Feather
Bike	Thumb	Flower	Squirrel	Pencil
Kite	Dog	Tree	Tiger	Bathtub
Whistle	Snake	Christmas tree	Lamp	Hairbrush
Skate	Fish	Leaf	Carrot	Flag
Car	Turtle	Bed	Apple	Clock
Airplane	Rabbit	Sofa	Fruit	Star
Pajamas	Vacuum	Shoe	Green	Plate
Nose	Stove	Foot	Yellow	Bucket
Mouth	Banana	Hand	Penguin	Box
Eye	Candy	Ear	Starfish	Button
Wall	Goat	Pineapple	Brown	Watch
Dishes	Zebra	Red	Gun	Basket
Bridge	Corn	Blue	Phone	Cloud
Ring	Orange	Book	Cup	
Feather	Black	House	Fire	
Bug	Purple	Knife	Spoon	

resembles the natural environment (multiple tacts in physical settings). The student's response mode can include vocalizations and signs.

The time limit for the GOM trial is 1 min. The 1-min time limit provides time for all stimulus presentations (trial) and response opportunities. The timer should be stopped after each array of five objects is presented and be restarted after the student begins responding to the new array. The 1-min trial for the tact GOM is shorter than the mand GOM because the student does not need to interact with the item, and the tact response can be completed quickly.

The trial begins with the verbal instruction, ''What are these?'' This prompt can be delivered vocally or by sign. The experimenter points to each object or picture in the array. After reaching the fifth item, the experimenter removes the objects and replaces them with a new array from the pool of tact items. At the beginning of each new presentation, the experimenter repeats the verbal prompt and points to the first object. Timing begins after the initial instruction.

Responses are coded as either correct or incorrect. Correct responses are those that correspond to the object or picture. Incorrect responses include incorrectly labeled items (e.g., pen for pencil). Self-corrections are counted as correct. If the student does not respond within 3 s, the experimenter prompts the student by pointing to the specific object and asking, ''What is this?'' If the student does not respond within another 3 s, the item is coded incorrect; the experimenter then points to the next object and says, ''What is this?''

FUTURE DIRECTIONS

GOMs used in the analysis of verbal behavior hold promise for behavior analysts. As in other applications, GOMs can provide parents and professionals with an additional data-collection method that can describe a student's growth over time. GOMs are economical, efficient, and sensitive to change over time and can be used with other assessments as part of a comprehensive evaluation of the student's progress. Ultimately, their utility will be decided by the data.

The ideas presented in this paper suggest an initial procedure for GOM assessments with two verbal operants. Future research should focus on developing normative rates for the mand and tact GOMs. These norma-

tive rates become the students' goals. The goals also allow a comparison of the students' present performance to that of a typical peer's manding and tacting repertoire. Also, the tact GOM we present serves as a basic indicator of a tacting repertoire. Future research should examine an expanded tact repertoire (e.g., a tact repertoire of a 10-year-old vs. that of a 20-year-old). In addition, as more research emerges, GOMs should be applied to other verbal operants. Finally, the mand and tact GOMs should be implemented with a wide variety of learners to assess their effectiveness and usefulness for the practice of behavior analysis.

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